

# Mauritania

## Water Solar System: A sustainable approach for villages and small towns

(presentation for the “Village Power 2000” congress)

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# Mauritania

**Area:** *total:* 1,030,700 sq km  
more than 90 percent of the  
land surface is desert with less  
than 200 mm rainfall per year

**Population:** 2,667,859 (July 2000 est.)

Due to heavy rural-urban migration,  
particularly over the last decade, more  
than half the population lives now in  
urban centers

**GNP per capita :** US\$ 380

Two entities under the authority of the Ministry of Hydraulics and Energy (MHE) are responsible for water supply in Mauritania:

SONELEC, a public utility, supplies water to an estimated 1.3 million users in the 12 largest cities of the country (including Nouakchott).

The **Department of Hydraulics (DH)**, supplies water to the rest of the country, 1,3 million people,

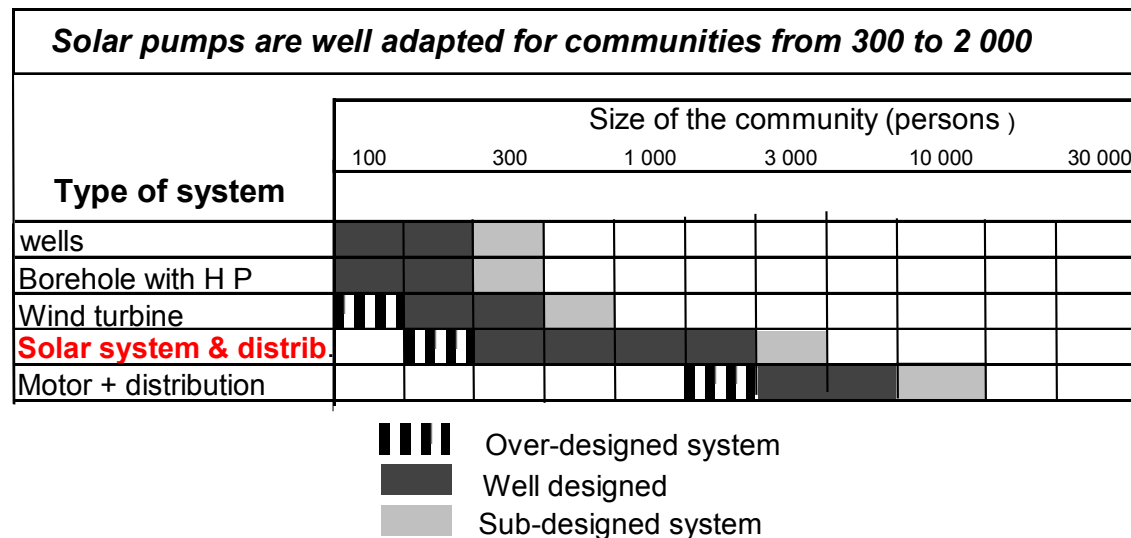
*For two decades the number of systems under the responsibility of the DH has risen from 200 in 1980 to more than 2,300 in 2000.*

Type of system	# of wells	Unit discharge (m3/day)	Cumulated discharge (m3/day)	% of the total
<b>Dug well</b> (mainly for livestock alimentation)	1500	8	12 000	38%
<b>Borehole</b> with hand pump	534	4	2 136	7%
<b>Borehole</b> + wind turbine	129	10	1 290	4%
<b>Borehole</b> + motor	94	50	4 700	15%
<b>Borehole</b> + distribution system	111	100	11 000	36%
<b>Solar system with distribution network</b>	<b>63</b>	<b>23</b>	<b>1 449</b>	<b>5%</b>
Total	2 368		31 226	

## Driving factors in the realization of the solar water supply in Mauritania



- **good sunshine** throughout the year
- **logistical difficulties** (long distance from a village to a city, bad roads...) that increase the cost of fuel supply and maintenance of thermal systems.
- a dynamic **private sector** that permits an efficient maintenance



# System construction

**System implantation;** During the pre-feasibility study, the implantation of the system requires a large consensus of the population and local authorities.

**Equipment choice:** so far the population and/or its representatives are not enough consulted in the choice of the equipment

**System Property:** all the systems are property of the State

**Design and construction:** are realized through the national private sector

**Equipment supply:** the main parts of the equipment are imported. Only the support's armature of the panels is manufactured in Mauritania

The provider has to supply and to guarantee the complete system (panels, transformer, pump...).

**Investment costs:** a large part of the initial investment cost is assumed by the Government and external agency but the population contributes in cash.

## Technology:

- Group of 14 to 48 solar panels of 50 Wc/each (700 to 2'400 Wc)
- transformer
- Electro-pump from 12 to 50m<sup>3</sup>/h
- Distribution network of an average of 1.5 Km with usually 3 standpipes and about 20 private connections

**Cost** US\$ 60 000 (borehole, tank & distribution network not included) for:

- approx. 2 000 persons
- and a production of approx. 10 l per day per person



## Reliability of the equipment

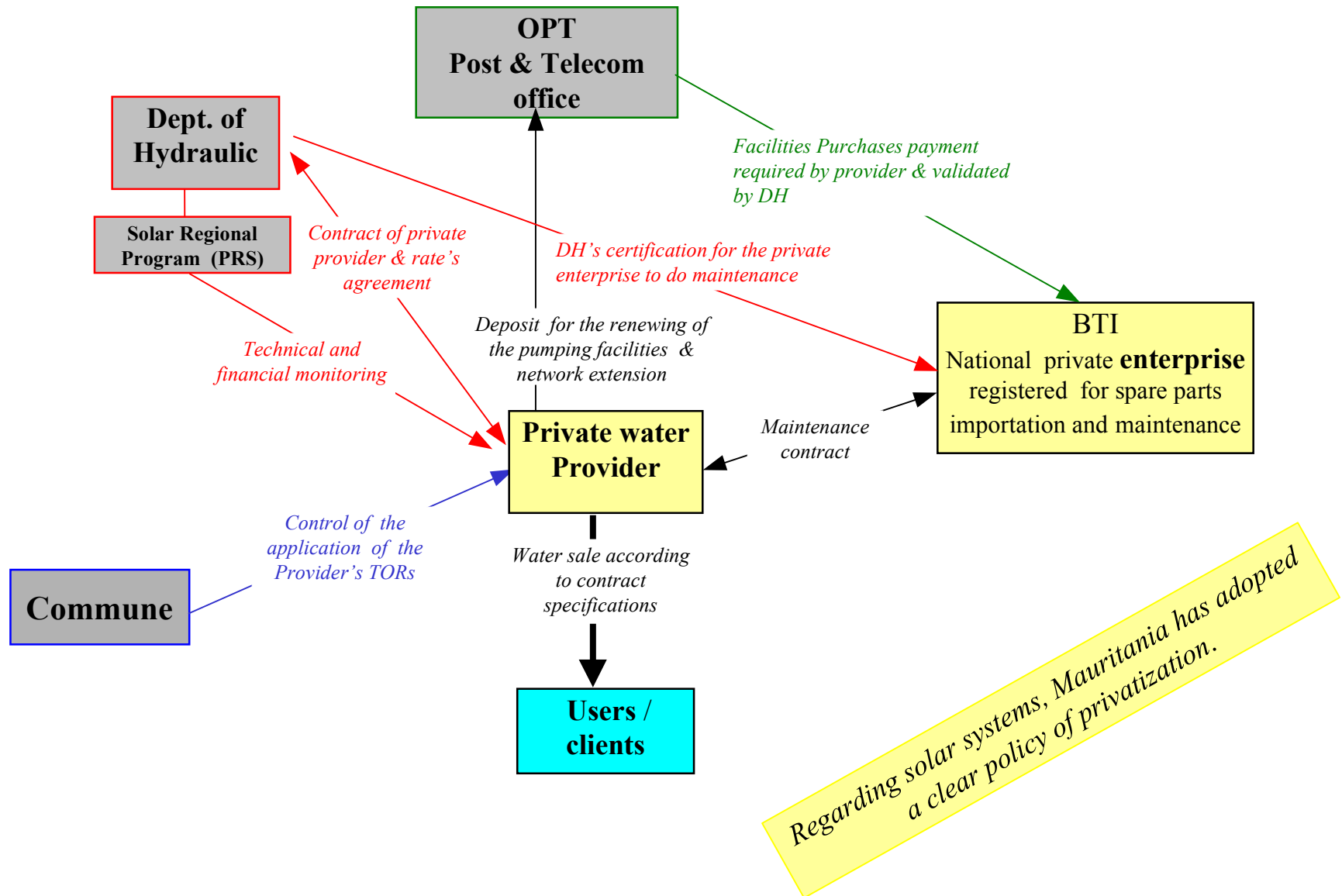
(over period of 4 years)

Panels failures 0%

Pumps failures 1.5 % per year



## Operation, maintenance and management of the solar system





## **Roles and responsibilities of the private water provider**

(highlights of the 1994 law)

- To ensure satisfactory service to the users
- To have at least the minimum staff mentioned in the law, with enough capacity
- To maintain an on-the-spot minimum stock of hardware (consumables, spares) for operation
- To ensure preventive and current maintenance
- To be responsible for maintenance (heavy and light) of pumping equipment
- To be responsible for the networks' technical, maintenance and upkeep management
- To train technicians and operate the water supply network
- To be responsible for financial management (billing from meters, subscriptions, payment collection)
- To pay a caution amount of US\$ 500

### *Other highlights:*

- Interruption in drinking water cannot exceed 24 hours
- A contract may cover one or more water supply systems
- Heavy maintenance work may be subcontracted to a technical specialist
- The provider deposits a percentage of the price of water intended for equipment renewal into a savings account with the Post and Telecommunication Office (OPT)



The price of water is approx US\$ 0.5 per cubic meter

## THE PRICE OF WATER

It must cover:

- Operational and maintenance costs
- Renewing fees for pumping facilities
- Staff expenses
- Provision for network extension
- Provider salary, taxes
- Various management expenses

DH fixes the maintenance and renewal charges;  
these provisions are generally respected

A majority (75%) of pumping stations set up by the Regional Solar Program possess a full guarantee maintenance contract with a private Mauritanian company, the “ Bureau Technique d'Intervention” (BTI).

**A maintenance contract  
with full guarantee for Solar installation facilities**

*Customer service is in charge of BTI under the responsibility of SIEMENS SOLAR*

- Contract with a 5-years full guarantee for spare parts and labor
- Repairs within 72 hours of being informed
- Yearly company visit to all systems
- Permanent spare parts stock
- Annual premium paid to BTI per system (from US\$ 260 to US\$ 900)

*The contract is renewable*

## Key factors of sustainability

### Social aspects

- The population gives a **high value to water supply**
- **Systems respond to the demand of the population**
- Users are satisfied with the service (indicator: the excellent bill collection rate)

### Institutional arrangement

- Mauritanian **Government** has developed since 1994 a policy of delegating water supply management in rural & small towns areas to **private providers**. This gives a clear relationship between private and public sector.
- **Responsibility** of DH to establish the contract with the private provider and ensures technical and financial control.

### Financial viability

- **Investment financing.** First financing for new infrastructure represents a major investment that will be beyond the capacity of most rural communities without external financial support (or without micro-credit access)
- **Operation, maintenance** and large part of **equipment renewal** are covered by the water tariff
- Various **private providers invest** in the expansion of the distribution network
- Creation of a **market for facilities, spare parts and system maintenance**

### Technical aspects

- **Reliability of the equipment**
- **Sustainable supply chain** of goods, spare parts and services through the private sector and without interference of donors.



## **Impact of the Mauritanian Regional Solar Program**

*(source: “Hydro-Conseil” evaluation)*

- Improvement of the health and condition of life of the population thanks to the consumption of good quality water from the borehole
- Development of economically profitable activities such as small gardening
- Clear reduction of rural migration towards the main towns.

### **Indirect effects**

- Emergence of other solar products or services as for example:
  - solar lighting,
  - solar refrigeration,
  - battery refill,
  - source of energy for radio or television
  - etc...